Livestock Mortality

Management (Disposal)

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Chapter 1 INTRODUCTION

Livestock producers are in the business of producing marketable meat products. However, there are always losses (mortality) in livestock production so every livestock producer must face the reality of carcass disposal. **Appendix A** gives average death losses to be expected in different species. These average values may have to be modified to reflect different housing alternatives and management systems.

Livestock mortality is a tremendous source of organic matter. A typical fresh carcass contains 32% dry matter. Of this 52% is protein, 41% is fat, and 6% is ash. These proportions are approximate and change slightly for each type of livestock. The potential impact to the environment for improper disposal includes:

- Smell - decomposition of organic matter, particularly the anaerobic breakdown of proteins by bacteria which will produce a foul odour.
- Vector - carrion-eating birds (ravens, magpies, buzzards etc.), mammals (scavengers) and insects can transmit disease and are a nuisance.
- Pathogens - disease-causing agents may still be viable.
- Excess Nutrients - concentrated source of nitrogen.

Therefore, engineered solutions must address the production of odour, limit the accessibility of vectors, and prevent the off-site movement of pathogens and nutrients.

Carcass disposal is regulated by the *Destruction and Disposal of Dead Animals Regulation* of the *Livestock Diseases Act* which is administered by Alberta Agriculture, Food and Rural Development (see **Appendix B**).

Dead animals must be disposed of in an acceptable manner within 48 hours of death. Proper disposal of carcasses is important for both the prevention of livestock disease transmission and the protection of air and water quality. Access to the carcasses by scavengers is only permitted under the guidelines for natural disposal (see **Appendix B**). This document provides options for disposal with associated advantages, disadvantages, and regulation requirements.

Chapter 2 DISPOSAL OPTIONS

Incineration

"Thorough and complete incineration" of a carcass (including all bones) is one option for livestock owners. While incineration can be convenient for those with access to the necessary equipment, producers need to realize that "complete incineration" is not likely to result from a simple burn pile in the backyard. Generally, a barrel or burn pile cannot meet emissions standards for combustion. It will not sustain a sufficiently high temperature long enough to completely destroy the most dense bones of a large animal carcass. Therefore, any animal matter remaining after incineration must be buried or otherwise discarded according to another approved disposal method.

Incinerators must be loaded and operated according to manufacturer's recommendations to maximize equipment life and minimize emission problems. Ashes should be removed frequently to maximize combustion and prevent damage to the equipment.

Producers choosing to install an on-farm incinerator should get a copy of the *Code of Practice for Small Incinerators*, published by Alberta Environment, and operate it in accordance with the *Substance Release Regulation (AR 124/93)*.

Incineration can be a convenient and environmentally safe method for disposing of dead poultry. However, expensive smokeless incinerators must be used and properly operated and maintained to prevent smoke and odour complaints. Nuisance complaints generated by poor maintenance and operational efforts are common. Incinerators wear out and must be replaced periodically. Fuel for incinerating carcasses is a significant expense. The cost of operation and discipline required to prevent complaints has reduced the popularity of incineration in recent years.

Advantages:

- Complete reduction of volume.
- Rapid oxidation to carbon and water.
- Environmentally safe (may require an air permit).
- Can dispose of mortalities as they are generated, therefore no temporary storage required.
- Residue from properly incinerated carcasses will not attract insects or rodents.
- System can be mobile, or a co-op could be formed to purchase an incinerator to be shared between farms.

Disadvantages:

- Major capital investment along with expensive fuel costs.
- Must be maintained (burners wear out and soot must be scrubbed out to prevent stack fires).
- Ash has no fertilizer potential and there may be a trace of heavy metals from micronutrients fed to the animals.
- There are real safety hazards associated with high temperature incinerators.

Livestock Burial

Burial is a suitable practice during the summer as frozen ground conditions make it difficult during the winter. Depending upon soil conditions, decomposition can be very slow. Burial sites should be located in low permeability soils, and areas with a high groundwater level or shallow aquifer must be avoided. Dead animals can be placed in a trench and backfilled each time a carcass is added. Carcasses must be covered with a minimum of 1 m (3 ft) of loose soil or 60 cm (2 ft) of compacted soil.

Burial can be a good method for the occasional single animal loss, but the concentration of burials (carcasses per acre) must be kept relatively low. Burial requires great care in site selection because as carcasses decompose they release materials that can

pollute groundwater, particularly if large volumes are buried. The weight of dead animals in the pit must not exceed 2500 kg (5500 lbs).

Advantages:

- Inexpensive (if using your own equipment).
- Biosecurity (no trucks coming from other farms to pick up carcasses).

Disadvantages:

- Difficult (if not impossible) in winter.
- Can cause groundwater pollution.
- Cannot bury in sites where the bottom of the pit is less than 1 m (3 ft) above the seasonal high water table.

Rendering

Another popular option is transporting carcasses to an approved disposal plant. Rendering is a convenient, clean and waste-free solution that ultimately recycles the remains into other products. The renderer generally provides on-farm pick up for a fee. However, some companies are selective about which species they will accept and which geographic locations they will serve. Since transportation is expensive, pick up will be scheduled when the renderer can make several stops in the same area.

Rendering processes dead animals into feed ingredients such as bone meal, meat meal, feather meal, and liquid animal fat. Animals that die during the winter can be frozen and delivered to the renderer at periodic convenient intervals. Rendering companies will generally not accept carcasses that do not remain intact when handled. Depending upon the end product of the rendering process, there may be other restrictions on carcass quality and condition.

Rendering companies that produce meat and bone meal and inedible tallow will usually accept animals regardless of the cause of death; other companies that produce an edible material may not. Refer to your local Yellow Pages Directory under "Rendering Companies" for the names of companies providing this service.

Timely pick up is the biggest challenge when using rendering as a mortality disposal method. Timing is crucial during the warm and hot seasons. The producer and/or the renderer must have the equipment to load large animals.

The producer may have to pay for disposal if poundage is not sufficient to warrant a full load, or if the quality of the carcass has degraded beyond economic value. In order to ensure the maximum gain from rendering, some producers choose to invest in on-site preservation methods. This is an economic choice. The producer must decide whether the cost and effort will be profitable compared to other methods of mortality disposal. An economic feasibility study for carcass preservation methods should be done that will permit on-farm storage and less frequent pickups. Methods that can be investigated include refrigeration, acid preservation and fermentation.

Refrigeration

Generally limited to poultry or young animals, refrigeration units are expensive to purchase and expensive to operate. As a preservation method, refrigeration works very well. However, the unit must have a sufficient refrigeration capacity to rapidly remove heat from the carcass.

Acid Preservation

In this method, punctured carcasses are placed in an acid solution (e.g., 3% sulfuric acid) which preserves the nutrient content and inactivates pathogens and micro-organisms. The renderer can process the acid-preserved organic matter into a high-nutrient feed ingredient. Safety is a primary issue, and acids (and the associated equipment) are expensive.

Fermentation

Lactic acid fermentation is the controlled degradation under anaerobic conditions. This is a self-limited process since organic acids will be produced as a by-product of anaerobic digestion. When the pH is reduced to approximately 4.5, the micro-organisms are inactivated and the decomposition process ceases. This process is referred to as pickling.

Processing of Rendered Carcasses

Carcasses are ground, cooked, and the liquid tallow (fat) is separated from the solids. The solids are extruded, dehydrated, and mixed with other ingredients. The finished product is a protein source that is blended as a feed ingredient. The tallow is used as an energy source in prepared animal feeds.

Collection vehicles must employ proper biosecurity measures to prevent disease transmission between farms. The expense and logistics of collecting small volumes of carcasses on a frequent basis prevents this disposal method from being widely accepted.

Advantages:

- The carcass is completely removed from the farm. It cannot do any environmental damage to the area surrounding the farm.

Disadvantages:

- Pathogenic transmission during pick up, transportation and processing is possible (care must be taken to prevent the pathogens from moving through the system). The rendering process must destroy all diseases.

Composting of Mortalities

Composting is a controlled, natural biological process of decomposition of organic materials in a predominantly aerobic environment. During the process, bacteria, fungi and other organisms break down organic materials to a stable mixture called compost, while consuming oxygen and releasing heat, water and carbon dioxide (CO_2). The finished compost resembles humus and can be used as a soil amendment. Composting reduces the volume of the parent materials and pathogens are destroyed if the process is controlled.

Composting of carcasses is possible and is primarily used for poultry and small animals. For more details on composting, see *Poultry Mortality Composting, Agdex 450/29-1 and Swine Mortality Composting, Agdex 440/29-1.* Proper management of the composting facility is required to ensure proper degeneration of the carcasses occurs. The basic requirements for successful composting are:

- maintaining aerobic conditions (in the presence of oxygen),
- maintaining proper temperature, moisture, pH, and carbon to nitrogen ratio, and
- maintaining a temperature of 55°C (131°F) for at least three days to ensure the adequate reduction of pathogens.

Other factors that must be considered when composting are:

- Properly constructed facilities and the use of primary and secondary bins.
- Facility must limit access of scavengers.
- Heavy equipment needs, including the use of a front-end loader.
- Daily management, monitoring and turning requirements of compost.
- Ensuring no contact with livestock if compost is applied to land (must be disposed of in an acceptable manner).
- Availability of necessary inputs of litter, straw and manure.
- The location of compost areas must be at least 100 m (328 ft) from a watercourse or body of water.
- Contaminated runoff must be collected and surface water directed away from the composting facility.

Advantages:

- Biosecurity.
- Year-round use.
- Relatively inexpensive.
- Environmentally sound.
- Value-added product to sell or use.
- Best and recommended method to handle catastrophic losses.
- Heat of composting process kills pathogens and insect larvae.

Disadvantages:

- May be labour intensive.
- Requires an impervious pad, rot-resistant walls, and a cover to repel rain.
- Takes practice to develop the technique.
- Requires a carbon source.

Natural Disposal

Disposal of carcasses by scavengers is a permitted method in Alberta but because of the very high probability of disease spread and of creating a public nuisance, this method is not recommended. All of the regulations concerning natural disposal outlined in **Appendix B** *Destruction and Disposal of Dead Animals* must be followed.

Appendix A DEATH LOSS VALUES

Species	Type	Average Death Loss (%)	Average Weight Per Bird or Animal (kg)	Cycle Length (days)	Expected Daily Mortality Weight (kg) [1]
Beef Cattle	Cows and Bulls	1.0	650	365	0.0178
(a) Cow-calf	Calves (newborn)	3.0	40	60	0.0200
	Calves (pre-weaning)	2.0	150	200	0.0150
	Replacements	1.0	350	240	0.0146
(b) Feedlot	Backgrounders	2.0	300	180	0.0333
	Feeders	1.0	425	120	0.0354
Bison	Cows and Bulls	2.0	550	365	0.0301
	Calves	2.0	75	240	0.0063
	Replacements	2.0	300	365	0.0164
	Feeders	2.0	350	365	0.0192
Dairy/Cattle	Cows	4.0	650	365	0.0712
	Calves (0 - 7 months)	10.0	125	210	0.0595
	Calves (7 - 14 months)	2.0	275	210	0.0262
	Replacements (14 - 27 months)	1.0	450	365	0.0123
Elk	Cows	3.2	275	365	0.0241
	Bulls	1.8	350	365	0.0173
	Calves (100 days)	1.8	100	100	0.0180
	Replacements	2.0	230	365	0.0126
Goats	Does and Bucks	3.0	67	365	0.0055
	Kids (pre-weaning)	7.5	7.5	60	0.0094
	Kids (feeder)	5.0	25	180	0.0069
Horses	Mares/Stallions (light/draft)	1.5	500/850	365	0.0205/0.0349
	Foals (light/draft)	6.0	110/150	365	0.0181/0.0247
	Yearlings (light/draft)	2.5	350/650	365	0.024/0.0445
Poultry	Hens (layers)	8.0	1.8	365	0.0004
	Hens/Cockerels (breeders)	14.5	3.8	294	0.0019
	Chicken Broilers	5.0	0.8	40	0.0010
	Turkey Broilers	5.5	2.3	77	0.0016
	Turkey Hens, Geese, Ducks	7.5	7.5	92	0.0061
	Turkey Toms	12.5	12.2	114	0.0134
Sheep	Ewes and Rams	3.0	70	365	0.0058
	Lambs (pre-weaning)	12.5	12	60	0.0250
	Lambs (feeders)	5.0	35	80	0.0219
Swine	Mature Sows/Boars	5.5	200	365	0.0301
	Pre-weaning	19.0	2	21	0.0181
	Weaners	2.6	13	42	0.0080
	Growers	1.7	45	56	0.0137
	Finishers	2.5	88	56	0.0393

[1] Daily mortality is calculated based on typical production cycle length and on a per animal or bird basis. For example, during calving season, newborn calf losses for a 60-day period is about 0.02 kg per day. For 100 calvings (including aborted and stillborn) the expected daily mortality would be 2 kg.

Appendix B ACTS AND REGULATIONS

Livestock Diseases Act: Destruction and Disposal of Dead Animals Regulation

Definitions

1 In this Regulation,

(a) "composting", in respect to a dead animal, means decomposing the dead animal or a part of it through a controlled bio-oxidation process that results in a stable humus-like material.

(b) "dead animal" means

(i) a domestic mammal or bird, or part of a domestic mammal or bird, that has died from a cause other than having been slaughtered for human consumption, and

(ii) inedible offal or condemned material from animals slaughtered for human consumption;

(c) "licensed", in respect of a rendering plant, means licensed under the Health of Animals Act (Canada);

(d) "natural disposal", in respect of a dead animal, means disposing of the dead animal in order to allow scavenging;

(e) "owner", in respect of a dead animal, means the owner of the dead animal or a person who is in possession or control of it;

(f) "rendering plant" means a rendering plant as defined in the Health of Animals Act (Canada);

(g) "reportable disease" means

(i) a disease designed as a reportable disease under the Health of Animals Act (Canada), or

(ii) a communicable disease referred to in Section 1 of the Designated Communicable Diseases Regulation (AR 8/98).

Methods of Disposal

2 (1) The owner of a dead animal shall dispose of the animal within 48 hours of its death in accordance with this section.

(2) When an animal is known or suspected to have died from an infectious disease that can be spread by scavengers or insects or from a reportable disease, the owner of the animal shall dispose of it in accordance with the directions of an inspector appointed under the Health of Animals Act (Canada) or a veterinary inspector appointed under the Livestock Diseases Act, but in no case may the animal be disposed of by natural disposal.

(3) The owner of the dead animal that has been euthanised with drugs or other chemical substances shall immediately take steps to prevent scavengers from gaining access to the dead animal between the time the animal is euthanised and the final disposal of the animal.

(4) Subject to subsection (2), the owner of the dead animal shall dispose of it by

(a) burying it in a farm burial pit, if

(i) the weight of the dead animals in the pit does not exceed 2500 kg,

(ii) the pit is

(A) at least 100 metres from wells or other domestic water intakes, streams, creeks, ponds, springs and high water marks of lakes and at least 25 metres from the edge of a coulee, major cut or embankment,

(B) at least 100 metres from any residences,

(C) at least 100 metres from any livestock facilities, including pastures, situated on land owned or leased by another person,

(D) at least 300 metres from a primary highway,

(E) at least 100 metres from a secondary highway, and

(F) at least 50 metres from any other road allowance,

(iii) the pit is covered with

(A) a minimum of one metre of loose soil or 0.6 metres of compacted soil, or

(B) a wooden or metal lid that is designed to exclude scavengers, if quicklime is applied to the dead animal in sufficient quantities to control flies and odour, and

(iv) the bottom of the pit is at least one metre above the seasonal high water table,

(b) burying it in a Class I or Class II landfill as defined in the Waste Control Regulation (AR 192/96), if the site has a full-time operator who agrees to immediately bury the dead animal,

(c) burning it in accordance with

(i) the Substance Release Regulation (AR 124/93), or

(ii) the Code of Practice for Small Incinerators, published by the Department of Environment,

(d) composting

(i) in a Class I compost facility as defined in the Waste Control Regulation (AR 192/96) that is designed, constructed and operated in accordance with sections 6 and 7 of the Code of Practice for Compost Facilities, published by the Department of Environment, or

(ii) subject to subsection (5), in a farm open compost pile that is

(A) located at least 100 metres from wells or other domestic water intakes, streams, creeks, ponds, springs and high water marks of lakes and at least 25 metres from the edge of a coulee, major cut or embankment,

(B) located at least 100 metres from any residences,

(C) designed in a manner that will exclude scavengers, and

(D) at least 100 metres from any livestock facilities, including pastures, situated on land owned or leased by another person,

(e) transporting it to a licensed rendering plant for disposal, or

(f) subject to subsection (6), natural disposal.

(5) Where under subsection (4)(d)(ii) animals are to be composted in a farm open compost pile,

(a) each animal or part of it must not exceed 100 kilograms,

(b) the maximum volume of the animals or parts of them must not exceed 25% of the total compost pile, and

(c) the animals or parts of them must be covered by at least 15 cm of composting material.

(6) Subject to subsection (2), a dead animal, other than inedible offal or condemned material, may be disposed of by natural disposal if

(a) the animal is disposed of on property owned or leased by the owner of the animal,

(b) the animal is not euthanised with drugs or other chemical substances,

(c) the total weight of the animals being disposed of at any one site does not exceed 1000 kg,

(d) there is a distance of at least 500 metres between disposal sites,

(e) the disposal site is

(i) at least 500 metres from wells or other domestic water intakes, streams, creeks, ponds, water wells, springs and high water marks of lakes and at least 25 metres from the edge of a coulee, major cut or embankment,

(ii) at least 400 metres from any livestock facilities, including pastures, situated on land owned or leased by another person,

(iii) at least 400 metres from any residences,

(iv) at least 400 metres from any road allowance, and

(v) at least 400 metres from any provincial park, recreation area, natural area, ecological reserve, wilderness area or forest recreation area,

(f) and disposing by natural disposition does not create a nuisance.

(7) Notwithstanding, subsection (1), the owner of a dead animal may store the dead animal for more than 48 hours after its death if it is stored

(a) for not more than one week in an enclosed structure with impervious walls and floors that have been constructed for the storage of dead animals,

(b) outside during winter months when the ambient temperature is low enough to keep the dead animal completely frozen, or

(c) in a freezer unit.

Rendering Plant

3 (1) The owner or operator of a rendering plant shall ensure that

(a) a dead animal rendered at the plant is subjected to such temperature and pressure as is necessary to render every portion of the carcass free from all viable pathogenic organisms, and

(b) microbiological quality assurance processes are in place to prevent the occurrence of viable pathogenic organisms.

(2) The owner or operator of a rendering plant when shipping material from a dead animal to another rendering plant shall ensure that

(a) the material is shipped in such a manner so as to prevent

(i) any dissemination of pathogenic organisms into the environment from the leakage of blood or other body fluids, and

(ii) the contamination of any animal or human food,

(b) the other rendering plant will render the material free of all viable pathogenic organisms, and

(c) a complete record is kept of the shipment, including the date of shipment, method of transport and the name and address of the rendering plant to which it was shipped.

Diagnosis of Animal Diseases

4 Nothing in this Regulation prohibits the collection and transport of a dead animal as may be required by a veterinarian or the owner of the dead animal for the diagnosis of animal diseases.

Dead Animal as Food

5 No person shall feed a dead animal to other food producing animals unless

(a) the material from the dead animal has been properly rendered at a licensed rendering plant and the prohibition to feed prohibited material to ruminants under the Health of Animals Regulation (Canada) is complied with, or

(b) the feeding of the material is a recognized means of stimulating natural immunity for specific disease conditions and the prohibition to feed prohibited material to ruminants under the Health of Animals Regulation (Canada) is complied with.

Advisory Committee

6 The Minister may appoint an advisory committee under section 7 of the Government Organization Act consisting of both government and industry representatives to oversee the implementation of this Regulation.

Repeal

7 The Regulations Regarding the Destruction and Disposal of Dead Animals (AR 128/66) are repealed.

Expiry

8 For the purpose of ensuring that this regulation is reviewed for ongoing relevancy and necessity, with the option that it may be repassed in its present or an amended form following a review, the Regulation expires on November 30, 2005.

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